

Applications ("PV-Wave 1"), PV-Wave Command Language ("PV-Wave 2"), and PV-Wave Point and Click Visual Data Analysis Software ("PV-Wave 3").

Independent claim 85 recites a virtual reality generator having:

an input module receiving the pre-processed financial information...;

a user interface module having a first input for selecting a non-integer terrain parameter for each of a first axis of a three dimensional interface and a second axis of the three dimensional interface and a second input for selecting an axis display parameter for a third axis of the three dimensional interface, the user interface module selecting a portion of the pre-processed financial information as a function of the non-integer terrain parameters and the axis display parameter; and

a virtual reality generator module ... displaying ... the selected portion of the pre-processed financial information ... within the virtual reality world.

Similar limitations are recited in amended independent claims 104, 106, 118, 121 and 123-125

As explained in the specification of the above-identified application and as recited in independent claim 85, the virtual reality generator according to the present invention receives pre-processed financial information from a financial analytic system and then selects a portion of the pre-processed financial information as a function of user-selected non-integer terrain parameters and an axis display parameter, displaying the selected portion of the pre-processed financial information as the virtual reality world.

For example, the present invention receives pre-processed financial information from a conventional financial analytic system, such as the CAPRI financial analysis system, which provides, for example: price and volume charts for any stock issue; volatility; fundamental equity statistics; graphical profit and loss and risk evaluation; and time, bond, futures and other derivative analyses. See Specification at p. 9, line 15 to p. 10, line 15. The user then selects, via the user interface module, a non-integer terrain parameter,

such as financial instrument, industry group or country, for two axes of the three-dimensional interface. See id. at p. 12, lines 3-17; p. 23, lines 7-24; p. 24, line 19 to p. 26, line 4; p. 33, lines 23-27; p. 35, lines 5-14. The user also selects an axis display parameter, such as percentage price change, average high/low price or price relative to a market index, to set the display of the third axis of the three-dimensional interface (e.g., the z or vertical axis). Id. at p. 23, lines 26-34.

As described in the specification, via the selection of the non-integer terrain parameters and the axis display parameter, the present invention displays a hybrid of numerical financial information and categorical market geography as a three-dimensional virtual reality world. Id. at p. 7, line 28 to p. 8, line 6; p. 23, lines 7-24. Indeed, Applicant's novel and non-obvious use of a non-cartesian coordinate system that is 1/3 graphical and 2/3 terrain allows multi-dimensional (e.g., shape, color, texture, flashing, spinning, sound, location) virtual reality display of financial information not previously provided by the prior art.

Applicant respectfully requests that the seven (7) reference Section 103 rejection be withdrawn because there is no suggestion, motivation or incentive in the references to combine the references as set forth in the rejection. Absent such suggestion, the rejection cannot be maintained. See Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 934 (Fed. Cir. 1990); Heidelberger Druckmaschinen AG v. Hantsch Comm'l Prods., Inc., 21 F.3d 1068, 1072 (Fed. Cir. 1994). Further, the motivation to combine references cannot come from the invention itself. In re Oetiker, 977 F.2d 1443, 1447 (Fed. Cir. 1992).

The Examiner's asserts that since "the references are within the same environment, they may be evaluated by what they would suggest to one of ordinary skill in the art". Assuming, *arguendo*, that the references are in the same environment (with which Applicant disagrees), the fact that

references are in the general field of the invention is of no avail without a reason in the references to make the combination asserted by the Examiner. See Northern Telecom, 908 F.2d at 934; In re Oetiker, 977 F.2d at 1447; Heidelberger, 21 F.3d at 1072.

Moreover, hindsight reconstruction by decomposing an invention into its constituent parts, finding each part in the prior art and then reassembling the parts into the invention is impermissible ex post analysis. See Matter of Mahurkar Double Lumen Litigation, 831 F. Supp. 1354, 1374-75 (N.D. Ill. 1993) (citing In re Fritch, 972 F.2d 1260, 1265-66 (Fed. Cir. 1992)); see also Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561, 1568 (Fed. Cir. 1987) (improper to use the patent as an instruction manual to lead to elements of the prior art); Diversitech Corp. v. Century Steps, Inc., 850 F.2d 675, 679 (Fed. Cir. 1988) (obviousness determination cannot use invention as blueprint) (citing Interconnect Planning Corp. v. Feil, 774 F.2d 1132, 1143 (Fed. Cir. 1985)); Grain Processing Corp. v. American Maize-Prods. Co., 840 F.2d 902, 907 (Fed. Cir. 1988) (care must be taken to avoid hindsight reconstruction).

Applicant respectfully submits that the virtual reality generator recited in amended claim 85 is in no way taught or suggested by the references, either individually or as a result of hindsight reconstruction of the seven (7) references. Unlike any prior art system, including those cited in the references of record, the present invention, as recited in claim 85, select portions of the pre-processed output of a financial analytic system for virtual reality processing to be displayed in a three-dimensional non-cartesian coordinate system, thereby generating a virtual reality world which provides a financial decisional and analytical tool that is neither taught nor suggested by the prior art.

As the title suggests, the Jacobson article provides a status report on actual and hypothesized applications of virtual reality. Applications of virtual reality described in

the Jacobson article include, for example, CAD-based building models and the building of virtual molecules for medical research. See Jacobson at 1. In addition, the Jacobson article describes the VIEW system that was developed by NASA for planning space missions -- in particular, a virtual reality display environment for data and monitors systems. Id. at 3. The Jacobson article also addresses application of virtual reality to finance, stating that virtual reality is "coming to" financial modeling, and describing a visualization technique for representing a security as a stalk of wheat. Id. at 1, 4. The Jacobson article ends by suggesting the use of virtual reality for stock market predictions -- but noting that it "may take a while" and that such a package would be available "by the mid-1990s." Id. at 9.

While describing the history of virtual reality and many applications of the technology at the time, none of the existing or hypothesized applications of virtual reality described in the Jacobson article, including the "field of wheat" hypothetical, describe, much less teach or suggest, the combination of known financial analytic systems outputting pre-processed financial information to be input to a virtual reality generator.¹ Neither is there any teaching or suggestion to make the further combination of virtual reality processing of a selected portion of the pre-processed financial information as a function of user-selected non-integer terrain parameters and an axis display parameter, as recited in claim 85.²

¹ One reason no one could implement a virtual reality system for real time stock analysis was due to the computational complexity of updating the virtual reality world based on both user input and changes in financial information. Applicant solved this problem in the present invention by, for example, receiving preprocessed financial information, thus allowing the virtual reality engine to concentrate on non-financial processing. No cited prior art reference teaches or suggests receiving preprocessed financial information for use by a virtual reality generator.

² The Examiner notes that financial analytic systems, such as CAPRI, were known in the art prior to the filing date of the present application. Applicant acknowledges that

Similar to the Jacobson article, the Rohrbough article also describes some existing and hypothesized applications of virtual reality, including building design, using virtual reality to develop "virtual kitchens" to be designed by customers, creating virtual movies and "turning a financial database into a giant simulated structure." See Rohrbough at 1, 2. Like the Jacobson article though, the Rohrbough article also fails to describe anything even remotely similar to the user-defined selection of pre-processed financial information which is displayed as a three-dimensional virtual reality world having a hybrid of numerical financial information and categorical market geography, as recited in independent claim 85.

The rejection of claim 85 asserts that the Jacobson and Rohrbough articles suggest "use of a virtual reality generator to display financial information in a virtual reality world" and that "the level of skill for the ordinary artisan ... was such that no undue experimentation would have been needed" to implement the present invention. See Office Action at pp. 3-4. Applicant has carefully studied the Jacobson and Rohrbough articles and respectfully asserts that both articles fail to teach or suggest the virtual reality generator recited in independent claim 85. Moreover, since both the Jacobson and Rohrbough articles fail to teach or suggest the claimed combination, both articles also necessarily fail to suggest that the level of one skilled in the art was sufficient to make the virtual reality generator recited in claim 85.

For example, the Examiner correctly notes that the Jacobson and Rohrbough articles suggest the use of a virtual reality generator to display financial information, but the rejection fails to apply the references to the claims of the

financial analytic systems were known. What was not known in the art at the time the present application was filed, however, was using the output of such a financial analytic system in the combination recited in, for example, claim 85.

present application.³ Applicant's claims recite a virtual reality generator displaying financial information as a three-dimensional virtual reality world by selecting a portion of pre-processed financial information as a function of non-integer terrain parameters and an axis display parameter, such as recited in claim 85. No portions of the cited references have been identified as teaching or suggesting such a virtual reality generator.

To cure the admitted deficiencies of the Jacobson and Rohrbough articles, five (5) additional references have been cited as "further evidence of the level of skill in the art": the Hindus and Saffo articles and three (3) PV-Wave brochures. Office Action at 3. Like the Jacobson and Rohrbough articles, however, the Saffo and Hindus articles generally describe possible applications of virtual reality, such as using virtual reality to tour buildings and for molecular modeling. While the Hindus and Saffo articles discussed the potential of virtual reality, the Saffo article mentioning that the technology may lead to representing abstract data as three-dimensional structures, both articles fail to teach or suggest, or even mention, a virtual reality generator displaying financial information by selecting a portion of pre-processed financial information as a function of non-integer terrain parameters and an axis display

³ Regarding claim 97, the rejection states that "once the idea of using virtual reality for display of financial information is known, the particular data and the particular format used to display the data becomes a design choice of the user." Office Action at p. 9. Applicant respectfully traverses this statement as fundamentally incorrect and in contravention of 35 U.S.C. §§ 101, 102, 103 and 112, which require that a patent be issued for novel, useful and nonobvious inventions described and claimed in the application. Unless the prior art teaches the claimed invention, including how to practice it, the claims must be allowed. The U.S. patent system is based on improvements of existing technologies. Yet, under the standard put forth in the rejection, no patents on using virtual reality would ever issue over the cited background articles, despite novel and nonobvious systems and methods invented for displaying financial information in a virtual reality world, such as Applicant's invention.

parameter, as recited in claim 85.

Reliance in the rejection on the PV-Wave references is particularly misplaced. As described in detail in Applicant's prior responses to Office Actions, PV-Wave provides two-dimensional and three-dimensional graphical visualization of data. Unlike a virtual reality system, however, which, as defined in the Jacobson article, allows interaction with and immersion in the displayed data such that the user can view the data from different perspectives, including from within the data, no such interaction and immersion is provided by a standard three-dimensional graphing package such as PV-Wave. Moreover, PV-Wave nowhere mentions, much less teaches or suggests, a three-dimensional display having two non-integer axes, as recited in independent claim 85. Indeed, the three-dimensional displays described in the PV-Wave references all have three numerical axes.

Further, the rejection cites the two-dimensional PV-Wave display of selected stocks versus cumulative percent change as an example of how PV-Wave allows for selection of inputs used in processing financial information. Office Action at pp. 4-5. Applicant respectfully submits that the example is completely inapposite. In particular, claim 85 recites a three-dimensional virtual reality world, two axes of which have non-integer terrain parameters. Applicant respectfully asserts that no such three-dimensional world is taught or suggested by the two-dimensional PV-Wave display, much less a three-dimensional virtual reality world which allows interaction with and immersion in the data and two axes of which have non-integer terrain parameters.

Therefore, Applicant respectfully submits that there is no suggestion or motivation to combine the cited references as asserted by the Examiner as non of the references teach or suggest a virtual reality display of preprocessed financial information in a three dimensional coordinate system having two axes with non-integer terrain parameters, as recited, for example, in claim 85. Moreover, Applicant respectfully submits that even if one were to

combine the references, such combination fails to teach or suggest the present invention. For example, using PV-Wave as a virtual reality application, for which there is no suggestion or teaching in the references to do, would at best produce a virtual reality graphing application having a three-dimensional orthogonal, cartesian coordinate system, i.e., having three 90° intersecting numerical axes. Such a combination would not, however, provide a virtual reality display of preprocessed financial information in a three dimensional coordinate system having two axes with non-integer terrain parameters, as recited, for example, in claim 85. Indeed, the three-dimensional cartesian coordinate system of PV-Wave actually teaches away from the three dimensional non-cartesian coordinate system of the present invention.

The failure of the prior art to teach or suggest such a virtual reality financial information system as recited in independent claim 85 is highlighted by the evidence of commercial success, industry praise and copying of the METAPHOR MIXER virtual reality system, the commercial embodiment of the virtual reality generator recited in claim 85. Such evidence was previously provided in the Rule 132 Declaration of the applicant filed on July 17, 1995 in the above-identified application. Assuming, arguendo, that prima facie obviousness has been established, which Applicant believes is not the case for the reasons set forth above, objective evidence such as commercial success must be considered before a conclusion on obviousness is reached. Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc., 807 F.2d 955, 960 (Fed. Cir. 1986). Evidence of secondary considerations is entitled to great weight and can overcome even a prima facie obviousness rejection. Rosemount, Inc. v. Beckman Inst., Inc., 727 F.2d 1540, 1546 (Fed. Cir. 1985); Alco Standard Co. v. Tennessee Valley Authority, 808 F.2d 1490, 1500-01 (Fed. Cir. 1986).

Nonetheless, in the Office Action dated October 31, 1995, this evidence was rejected on the assertion that there was a lack of nexus between the claimed invention and the

evidence. See October 31, 1995 Office Action at p. 10-11. Applicant respectfully submits that a prima facie case of the requested nexus was clearly established by the Applicant. Applicant has represented that the claimed virtual reality generator is sold commercially as the METAPHOR MIXER and that evidence of secondary considerations of nonobviousness was directly connected to the claimed invention. For example, ¶¶ 15 and 17 of the Rule 132 declaration stated that the commercial success of the METAPHOR MIXER, the commercial embodiment of the virtual reality generator recited in claim 34 (now claim 85), was due to the claimed virtual reality generator and not to other extraneous factors such as advertising or consumption by existing customers. Accordingly, the objective evidence of secondary considerations submitted by the Applicant, including evidence of (i) commercial success, (ii) industry praise and (iii) copying, clearly demonstrates the nonobviousness of the claimed invention and establishes the requisite nexus between the evidence and the claimed invention. See Diversitech Corp. v. Century Steps, Inc., 850 F.2d 625 (Fed. Cir. 1988).

Therefore, Applicant respectfully submits that the references cited by the Examiner, either individually or in combination, including the combination of all seven (7) references, neither teach nor suggest the present invention as recited in independent claim 85. In addition, Applicant in no way admits that the cited references relied are prior art and Applicant reserves the right to swear behind the references. Applicant respectfully submits that amended independent claims 104, 106, 118, 121 and 123-125 are also not taught or suggested by the references cited by the Examiner for the same reasons as claim 85.

As the dependent claims depend from and therefore include all of the limitations of the amended independent claims, Applicant respectfully submits that claims 86-92, 94-103, 105, 107-117, 119-120, 122 and 126-127 also are not taught or suggested by the references cited by the Examiner, either individually or in combination.

Regarding the provisional obviousness-type double-patenting rejection of claims 85-125, Applicant will file an appropriate response once the claims in co-pending application Serial No. 07/954,775 are allowed.

Finally, Applicant notes that there still appears to be some misunderstanding of the present invention. Contrary to the rejection of claims 90-91, which misstates that metaphors rotate to allow the user to see the entire shape of the metaphor, rotation of metaphors is actually one possible display parameter and the rotation of a metaphor describes some predetermined financial attribute selected by the user and is not related to the shape of the metaphor. See e.g., Specification at p. 19, line 26 to p. 20, line 9. Applicant invites the Examiner to contact Applicant's attorney to discuss any questions relating to the present invention.

III. Conclusion

The invention of claims 85-92 and 94-127 is new, non-obvious, and useful. As stated above, (1) the cited references do not teach or suggest receiving preprocessed financial information, (2) the cited references fail to teach or suggest displaying financial information on a three-dimensional interface of a virtual reality world having two non-integer axes, (3) there is no motivation, suggestion or incentive to combine the cited references and (4) even a prima facie case of obviousness would be overcome by Applicant's evidence of secondary considerations including commercial success, industry praise and copying. Applicant respectfully requests reconsideration and allowance of claims 85-92 and 94-127.

Respectfully submitted,
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Dated: 9/20/96

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